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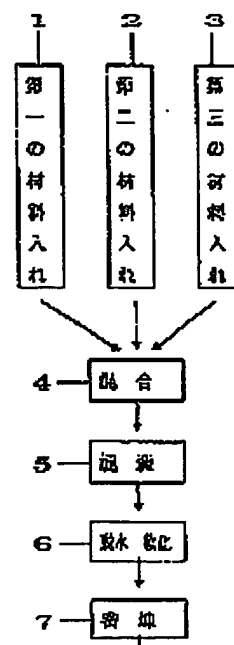
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(54) 【発明の名称】 生物分解樹脂製品、その材料、その製造方法

(57) 【要約】

【課題】 市場に販売しているプラスチック製品及び商品化のプラスチック梱包緩衝材、プラスチック袋、ゴミ袋、弁当用具等は殆ど分解できないものである。

【解決手段】 15～86重量%の澱粉、8～70重量%のポリエチレン或はポリスチレン又はポリビニルアルコール、4～12重量%交差結合剤、2～3重量%の促進剤を含む生物分解樹脂製品である。この生物分解樹脂で造った製品は廃棄してから自然環境と埋める条件の下で、虫喰い、微生物分解と酸化分解によって、300日左右でほとんど二酸化炭素と水に分解して、20%くらい小さい粒状と粉末状に成って、環境汚染はほとんどない。



【特許請求の範囲】

【請求項1】 15～86重量%の澱粉、8～70重量%のポリエチレン或はポリスチレン又はポリビニルアルコール、4～12重量%交叉結合剤、2～3重量%の促進剤を含む生物分解樹脂製品。

【請求項2】 交叉結合剤がグリセロール、又はソリトールの1種類あるいは2種類からなる請求項1記載の生物分解樹脂製品。

【請求項3】 促進剤が水酸化アルミニウム、酸化銅、食物油、又はステアリンの中の1種類、2種類、3種類或は4種類からなる請求項1又は2記載の生物分解樹脂製品。

【請求項4】 生物分解のポリエチレン或は生物分解のポリスチレン又は生物分解のポリビニルアルコールからなる生物分解樹脂原材料。

【請求項5】 生物分解のポリエチレン或は生物分解のポリスチレン又は生物分解のポリビニルアルコールからなる生物分解樹脂専用材料。

【請求項6】 農業用シート、包装袋、食品袋、買物袋、ゴミ袋、育苗皿、弁当用具、フォーム板材、フォーム果物保護ネット、又はフォーム緩衝材である請求項1又は2記載の生物分解樹脂製品。

【請求項7】 15～86重量%の澱粉、8～70重量%のポリエチレン或はポリスチレン又はポリビニルアルコール、4～12重量%の交叉結合剤、2～3重量%の促進剤を含む生物分解樹脂の製造方法。

【請求項8】 15～86重量%の澱粉、8～70重量%のポリエチレン或はポリスチレン又はポリビニルアルコール、4～12重量%交叉結合剤、2～3重量%の促進剤を含む生物分解樹脂製の農業用シート、包装袋、食品袋、買物袋、ゴミ袋、育苗皿、弁当用具、フォーム板材、フォーム果物保護ネット、又はフォーム緩衝材よりなる生物分解樹脂製品。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、生物分解樹脂材料、製品及び製作方法に関する。

【0002】

【発明が解決しようとする課題】 今、市場に販売しているプラスチック製品及び商品化のプラスチック梱包緩衝材、プラスチック袋、ゴミ袋、弁当用具等はほとんど分解できないものと言える。このような分解できないのは使ったから、部分のものはリサイクル他に、ほとんどゴミ場で埋める。ポリエチレン、ポリスチレンは埋める条件の下で分解することは長年月を要する。それ故、捨てたプラスチックは「白色公害」になって、環境汚染

エチレンシート及び製品、緩衝材、ポリスチレン発泡及び弁当用具などの生物分解樹脂材に係わり、このような生物分解樹脂材で造った製品は廃棄してから自然で埋める条件の下で、空堀り、微生物分解と酸化分解によって300日左右でほとんど二酸化炭素と水に分解して、20%くらい小さい粒状と粉末状に成って、環境は殆どない生物分解樹脂製品を提供しようとするものである。

【0004】

10 【課題を解決するための手段】 第1の発明に係わる生物分解樹脂製品は、15～86重量%の澱粉、8～70重量%のポリエチレン或はポリスチレン又はポリビニルアルコール、4～12重量%の交叉結合剤、2～3重量%の促進剤よりなるものである。

【0005】 第2の発明に係わる生物分解樹脂製品は第1の発明において交叉結合剤がグリセロール、又はソリトールの1種類或いは2種類からなるものである。

20 【0006】 第3の発明に係わる生物分解樹脂製品は第1又は第2の発明において促進剤が水酸化アルミニウム、酸化銅、植物油、又はステアリンの中の1種類、2種類、3種類或いは4種類からなるものである。

【0007】 第4の発明に係わる生物分解樹脂原材料は、生物分解のポリエチレン或いは生物分解のポリスチレン又は生物分解のポリビニルアルコールからなるものである。

【0008】 第5の発明に係わる生物分解樹脂専用材料は、生物分解ポリエチレン或いは生物分解のポリスチレン又は生物分解のポリビニルアルコールから成るものである。

30 【0009】 第6の発明に係わる生物分解樹脂製品は第1又は第2の発明における生物分解樹脂製品が、農業用シート、包装袋、食品袋、買物袋、ゴミ袋、育苗皿、弁当用具、フォーム板材、フォーム果物保護ネット、又はフォーム緩衝材よりなるものである。

【0010】 第7の発明に係わる生物分解樹脂の製造方法は、15～86重量%の澱粉、8～70重量%のポリエチレン或はポリスチレン又はポリビニルアルコール、4～12重量%の交叉結合剤、2～3重量%の促進剤を含む生物分解樹脂の製造方法である。

40 【0011】 第8の発明に係わる生物分解樹脂製品は15～86重量%の澱粉、8～70重量%のポリエチレン或はポリスチレン又はポリビニルアルコール、4～12重量%交叉結合剤、2～3重量%の促進剤を含む生物分解樹脂製の農業用シート、包装袋、食品袋、買物袋、ゴミ袋、育苗皿、弁当用具、フォーム板材、フォーム果物保護ネット、又はフォーム緩衝材よりなるものである。

利用の値打ちのないプラスチック製品を目安として、例えば、ポリエチレンシート及び製品、緩衝材、ポリスチレン発泡材及び弁当用具などの生物分解樹脂材に換わり、このような生物分解樹脂材で造った製品は廃棄してから自然環境と埋める条件の下で、虫喰い、微生物分解と酸化分解によって300日左右でほとんど二酸化炭素と水に分解して、20%くらい小さい粒状と粉末状に成って、環境汚染は殆どない。

【0013】本発明は生物分解樹脂製品について、特に生物分解樹脂梱包材、とりわけ、生物分解樹脂ポリエチレンシートとシート製品、ポリエチレン発泡緩衝材、ポリエチレンエアキャップとポリエチレン発泡板材及び弁当用具に及ぶ。

【0014】本発明の製品は澱粉を基本材料として、一定量のポリエチレン或いはポリスチレン又はポリビニルアルコールを混せて入れ、交叉結合剤：グリセロール (Glycerol)、ソリビトール (Sorbierite)、プラスチックサイザ (Plasticizer)：植物油、潤滑油、ステアリン酸カルシウム (Calcium Stearate)、促進剤：水酸化アルミニウム (Aluminum Hydroxide)、酸化燐、酸化カルシウム、ステアリン酸鉛と充分に混合した後、反応型ダブルねじガイド押出し機器を通して加工すると、澱粉量を86% (最高) まで含む原材料を造れる。この原材料を使って、Blow Moldingして、生物分解のシート膜を発泡して生物分解の緩衝材、果物の保護ネット、フォーム管状材、フォーム板材、弁当箱などを生産できる。

【0015】本発明の生物分解樹脂製品は15~86重量%の澱粉、8~70重量%のポリエチレン或るいはポリスチレン、4~12重量%の交叉結合剤、2~3重量%の自動酸化剤と他の促進剤を含む。

【0016】本発明の中に使う澱粉は工業用の澱粉である。粒度は100メッシュ (mesh) ~600メッシュで、具体的に言えば、トウモロコシ澱粉とさつま芋澱粉の中の1種類とか、2種類とか、3種類などである。本発明の中に使う交叉結合剤は、グリセロール (Glycerol)、ソリビトール (Sorbierite) の1種類又は2種類で、グリセロール (Glycerol) は石鹸化 (乳状) グリセロール (Glycerol) 又は複合グリセロール (Glycerol) である。

【0017】本発明の中の促進剤は水酸化アルミニウム (Aluminum Hydroxide)、酸化燐、植物油、ステアリン酸鉄の中の1種類とか、2種類とか、3種類或いは4種類である。

【0019】普通の澱粉は水性の物質で、しかし、重合体は増水性の物質なので、普通の澱粉と高重合体いっしょに融合することができないのである。

【0020】生物分解樹脂の原材料或いは専門用料を産する時、まず、生産する過程中に澱粉を脱水させて能を変えさせて、性能を変えた澱粉の水分の含有量は0.5%~2.5%の間に制御する。

【0021】

【実施例】 図1において、1は澱粉、2はポリエチレン、ポリスチレン、ポリビニルアルコール、3は交叉結合剤及び促進剤である。4は複合、5は複線、6は水、軟化、7は密煉、8は切断、9は押出である。

【0022】本発明の中に使う設備は、まず、長さと径の比率が32:1~48:1の比率大きい反応型筒本式 Extruder Twin Seren が優秀に好ましい。其の加工性能は図1のようなものである。図1の設備でジク (Dicing) する時、脱水、密煉 (Plastify) した澱粉は高速密煉 (高速 Babbury mixer) と高速切断力及び交叉結合剤作用によって、高重合体と融合することになって、生物分解樹脂の原材料と専門用料を造られる事になる。

【0023】普通の澱粉は耐熱の性能があまり好くない。一般に加工温度は200℃以上になると、炭化 (carbonization) の事を発生するようになる。本発明中での加工プロセス温度は材料の軟化 (Fastify) を充分に守ることと、また、澱粉を崩させないために、下限が80℃、上限185℃を優先選ばれた。

【0024】本発明の原材料を専門用料を使って、長さと直径の比率が20:1~30:1のフィルム ブローイング (Film Blowing) で生物分解シート膜のような製品例えば、農業用のシート膜、食品用梱包用袋、買物用袋、ゴミ袋などを造られる。

【0025】本発明の原材料と専門用料を使って、系設備でブタンガス又はアゾジカルボン酸アミド発泡剤或いはブタンガス+アゾジカルボン酸アミド発泡剤の添加剤を入れて生物分解発泡材の板材、フォームネット材、フォーム管材、フォーム弁当箱と緩衝材などが造られる。

【0026】本発明については下のような実施例を考て詳しく説明する。しかし、本発明の内容がこれらの実施例を限らない事は、はっきり言わなければならない事である。

【0027】実施例1. 55重量%のポリエチレン 35重量%の澱粉、7重量%のグリセロール (Glycerol) ~ソリビトール (Sorbierite)

(Dicing)した原料料をブローモルディング(Blow Molding)し、フォーミング(Forming)して各種の製品を造られる。各種の材料の重量、*

*プロセス温度及び製品の物理性能は表1のように
【表1】

実施例	成 分						加工温度	引張強度	耐熱温度	引張伸度	折れ
	PE	PS	炭粉	緩衝剤	プラスチック	緩衝剤	℃	Mpa	℃	%	回
1	55		35	7	2	1	80~170	12.5 10	100		
2		59	30	8	1	2	90~180	1.5 1.7	80	8%	16回連続

【0028】PE：ポリエチレン

PS：ポリスチレン

【0029】実施例2. 49重量%のポリスチレン、30重量%の澱粉、8重量%のグリセロール(Glycerol)或いはソリビトール(Sorbitol)1重量%のプラスチックサイザー(Plasticizer)、2重量%の促進剤を混合して、ジクシング(Dicing)した後、発泡設備で、発泡製品が造られる。各種の材料の重量、プロセス温度及び製品の物理性能は表1のように表1を見ると、実施例1と実施例2の方法で造った製品は其の物理性能が一般の使用の要求を満足させることがはっきり分かるようになった。平板法※

10※と試験室法及び堆肥法で本発明の製品の生物分解性能を確認する。その確認の方法と結果は下のように

1. 平板法：ASTM21-90の技術基準に準じて平板法でサンプルの生物分解性能を測って確認する。サンプルを3cm×3cm片材に切って、これを予め煮した培養基平板の中央に置いて、一定の濃度の菌液混合培養液を吹き付けて、カバーを被せて、30℃、1℃、相対湿度95%以上の低温箱内に入れて、28日掛かりで培養する。定期的に真菌の繁殖の状況を観察して記録する。その結果は表2のように

【0030】

【表2】

番号	サンプル名称	菌糸繁殖状況(級)				備 註
		7日	14日	21日	28日	
1	生物分解	1	2	3-	3	
2	PS発泡	1	2	3-	3+	
3	製 品	1	2	2+	3	

【0031】

表2の中： 0級：無繁殖痕跡

1級：繁殖痕跡≤10%

2級：軽度繁殖10%~30%

3級：中度繁殖30%~60%

4級：大度繁殖60%以上或は全表面除す。

【0032】2. 堆肥法：サンプルを20cm×15cmの片材に切る。其のサンプルの引く張り強度と重量を★

★測ってから、長さ100cm×幅300cm×高さ1cmの穴の中で水平に置いて、上面に生活ゴミを被せて、毎日、気温と土壌の水分を測って、定期的にサンプルを取って、重量損失率(低減率)と強度を測って、記録する。その結果は表3のように

【0033】

【表3】

埋め時間	重量損失率(低減率)%	引張強度(N)	引張伸び度%
0日	0	5.89	254.31
20日	13	5.18	209.14
40日	29	4.68	116.72
60日	44	3.97	67.28

【0034】表2と表3の数値から見える、生物分解樹脂製品は廃棄した後、自然環境の中で埋めれば、微生物の生長速度は速いので、重量損失率(低減率)が速いし、劣化も速いのです。良好の分解性能がある事を有している。

は、ポリエチレンシート及び製品、緩衝材、ポリスチレン発泡材及び弁当用具などを生物分解樹脂材で換わって、このような生物分解樹脂材で造った製品は廃棄してから自然環境と埋める条件の下で虫喰い、微生物分解分解によって300日左右でほとんど二酸化炭素

言及び以上の通りの説明書の内容を外れていない変動と
改進では本発明の範囲に属している。

【図面の簡単な説明】

【図1】 本発明の実施の設備を示すフローチャート
図である。

【符号の説明】

1 澱粉

2 ポリエチレン、ポリスチレン、ポリビニールアル*

* コール

3 交叉結合剤、促進剤

4 混合

5 混練

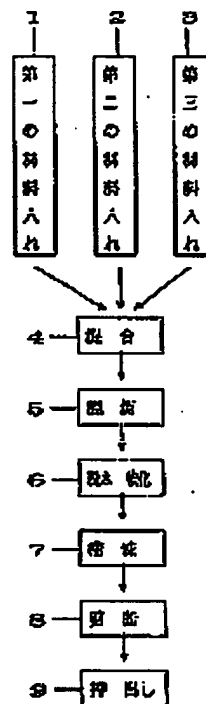
6 脱水、軟化

7 密着

8 剪断

9 押出し

【図1】



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CLAIMS

[Claim(s)]

[Claim 1] The biodegradation resin product containing 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, a 4 – 12-% of the weight cross linkage agent, and 2 – 3% of the weight of an accelerator.

[Claim 2] The biodegradation resin product according to claim 1 with which a cross linkage agent consists of one kind of glycerol or a SORIBI toll, or two kinds.

[Claim 3] The biodegradation resin product according to claim 1 or 2 with which an accelerator consists of one kind in an aluminum hydroxide, oxidation wax, a food oil, or stearin, two kinds, three kinds, or four kinds.

[Claim 4] The biodegradation resin raw material which consists of the polyethylene of biodegradation, polystyrene of biodegradation, or polyvinyl alcohol of biodegradation.

[Claim 5] The ingredient only for biodegradation resin which consists of the polyethylene of biodegradation, polystyrene of biodegradation, or polyvinyl alcohol of biodegradation.

[Claim 6] The sheet for agriculture, a package bag, a food bag, a shopping bag, a garbage bag, a seedling raising pan, a valve implement for daily use, a form plate, a form fruit protection network, or the biodegradation resin product according to claim 1 or 2 that is form shock absorbing material.

[Claim 7] The manufacture approach of the biodegradation resin containing 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, 4 – 12% of the weight of a cross linkage agent, and 2 – 3% of the weight of an accelerator.

[Claim 8] The biodegradation resin product which consists of the sheet for agriculture, the package bag, the food bag, the shopping bag, the garbage bag, the seedling raising pan, the valve implement for daily use, the form plate, the form fruit protection network, or form shock absorbing material made of the biodegradation resin containing 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, a 4 – 12-% of the weight cross linkage agent, and 2 – 3% of the weight of an accelerator.

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CLAIMS

[Claim(s)]

[Claim 1] The biodegradation resin product containing 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, a 4 – 12-% of the weight cross linkage agent, and 2 – 3% of the weight of an accelerator.

[Claim 2] The biodegradation resin product according to claim 1 with which a cross linkage agent consists of one kind of glycerol or a SORIBI toll, or two kinds.

[Claim 3] The biodegradation resin product according to claim 1 or 2 with which an accelerator consists of one kind in an aluminum hydroxide, oxidation wax, a food oil, or stearin, two kinds, three kinds, or four kinds.

[Claim 4] The biodegradation resin raw material which consists of the polyethylene of biodegradation, polystyrene of biodegradation, or polyvinyl alcohol of biodegradation.

[Claim 5] The ingredient only for biodegradation resin which consists of the polyethylene of biodegradation, polystyrene of biodegradation, or polyvinyl alcohol of biodegradation.

[Claim 6] The sheet for agriculture, a package bag, a food bag, a shopping bag, a garbage bag, a seedling raising pan, a valve implement for daily use, a form plate, a form fruit protection network, or the biodegradation resin product according to claim 1 or 2 that is form shock absorbing material.

[Claim 7] The manufacture approach of the biodegradation resin containing 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, 4 – 12% of the weight of a cross linkage agent, and 2 – 3% of the weight of an accelerator.

[Claim 8] The biodegradation resin product which consists of the sheet for agriculture, the package bag, the food bag, the shopping bag, the garbage bag, the seedling raising pan, the valve implement for daily use, the form plate, the form fruit protection network, or form shock absorbing material made of the biodegradation resin containing 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, a 4 – 12-% of the weight cross linkage agent, and 2 – 3% of the weight of an accelerator.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a biodegradation resin ingredient, a product, and the fabrication approach.

[0002]

[Problem(s) to be Solved by the Invention] Now, the plastic currently sold to a commercial scene and the plastics packing shock absorbing material of commercialization, a plastics bag, a garbage bag, a valve implement for daily use, etc. can be said to be what can hardly be decomposed. Since such a thing that cannot be decomposed used, the thing of a part is almost filled up with a dust field to recycle etc. Decomposing polyethylene and polystyrene under the conditions to bury requires the moon for years. So, the thrown-away plastics becomes a "white public nuisance" and not only environmental pollution but ecology natural balance is influenced.

[0003] This invention makes the plastic which does not have the value of utilization even if there are many distribution costs and recycle is not only difficult, but they collect on a sale commercial scene a rule of thumb. After discarding the product built with such biodegradation resin material with respect to biodegradation resin material, such as a polyethylene sheet and a product, shock absorbing material, polystyrene foam, and a valve implement for daily use, for example, under natural environment and the conditions to bury By worm-eaten, microbial degradation, and oxidative degradation, it is almost going to decompose into a carbon dioxide and water by right and left for 300 days, and is going to offer the biodegradation resin product small about 20% which changes that it is granular in the shape of powder, and environmental pollution does not almost have.

[0004] [Means for Solving the Problem] The biodegradation resin product concerning the 1st invention consists of 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, 4 – 12% of the weight of a cross linkage agent, and 2 – 3% of the weight of an accelerator.

[0005] As for the biodegradation resin product concerning the 2nd invention, a cross linkage agent consists of one kind of glycerol or a SORIBI toll, or two kinds in the 1st invention.

[0006] As for the biodegradation resin product concerning the 3rd invention, an accelerator consists of one kind in an aluminum hydroxide, oxidation wax, vegetable oil, or stearin, two kinds, three kinds, or four kinds in the 1st or 2nd invention.

[0007] The biodegradation resin raw material concerning the 4th invention consists of the polyethylene of biodegradation, polystyrene of biodegradation, or polyvinyl alcohol of biodegradation.

[0008] The ingredient only for biodegradation resin concerning the 5th invention consists of biodegradation polyethylene, the polystyrene of biodegradation, or the polyvinyl alcohol of biodegradation.

[0009] A biodegradation resin product [in / in the biodegradation resin product concerning the 6th invention / the 1st or 2nd invention] consists of the sheet for agriculture, a package bag, a food bag, a shopping bag, a garbage bag, a seedling raising pan, a valve implement for daily use, a form plate, a form fruit protection network, or form shock absorbing material.

[0010] The manufacture approach of the biodegradation resin concerning the 7th invention is the manufacture approach of the biodegradation resin containing 15 – 86% of the weight of starch, 8

— 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, 4 – 12% of the weight of a cross linkage agent, and 2 – 3% of the weight of an accelerator.

[0011] The biodegradation resin product concerning the 8th invention consists of the sheet for agriculture, the package bag, the food bag, the shopping bag, the garbage bag, the seedling raising pan, the valve implement for daily use, the form plate, the form fruit protection network, or form shock absorbing material made of the biodegradation resin containing 15 – 86% of the weight of starch, 8 – 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, a 4 – 12% of the weight cross linkage agent, and 2 – 3% of the weight of an accelerator.

[0012]

[Embodiment of the Invention] This invention makes the plastic which does not have the value of utilization even if there are many distribution costs and recycle is not only difficult, but they collect on a sale commercial scene a rule of thumb. After discarding the product which replaced with biodegradation resin material, such as a polyethylene sheet and a product, shock absorbing material, polystyrene foam, and a valve implement for daily use, and was built with such biodegradation resin material, for example, under natural environment and the conditions to bury worm-eaten, microbial degradation, and oxidative degradation will almost decompose into a carbon dioxide and water by right and left for 300 days, and small about 20% -- it changes that it is granular in the shape of powder, and there is almost no environmental pollution.

[0013] Especially this invention attains to biodegradation resin packaging, division, a biodegradation resin polyethylene sheet, a sheet product, polyethylene foaming shock absorbing material and a polyethylene air cap, a polyethylene foaming plate, and a valve implement for daily use about a biodegradation resin product.

[0014] The product of this invention makes starch a basic material, and the polyethylene, polystyrene, or polyvinyl alcohol of a constant rate is mixed and put in. Cross linkage agent : Glycerol (Glycerol), a SORIBI toll (Sorbierite), Plus CHISAIZA (Plasticizer) : Vegetable oil, a lubricating oil, calcium stearate (Calcium Stearate), Accelerator: If it fully mixes with an aluminum hydroxide (Aluminum Hydroxide), oxidization wax, a calcium oxide, and lead stearate and is processed through a reaction type double screw-thread guide extruder machine the back, the raw material which contains the amount of starch to 86% (highest) can be built. This raw material is used and it is Blow. Molding is carried out, it foams on the sheet film of biodegradation, and the shock absorbing material of biodegradation, protection NETO of fruit, form tubular material, a form plate, a lunch box, etc. can be produced.

[0015] The biodegradation resin product of this invention contains the accelerator of polystyrene, 4 – 12% of the weight of a cross linkage agent, 2 – 3% of the weight of an autooxidation agent, and others. [***** / 15 – 86% of the weight of starch, and / 8 – 70% of the weight of / polyethylene]

[0016] The starch used into this invention is starch of industrial use. Grain size will be 100 meshes (mesh) – 600 meshes, and if it says concretely, they will be one kind in amylum maydis and sweet potato starch, two kinds, three kinds, etc. The cross linkage agent used into this invention is glycerol (Glycerol). In one kind of a SORIBI toll (Sorbierite), or two kinds, glycerol (Glycerol) is soap-ized (milky) glycerol (Glycerol) or compound glycerol (Glycerol).

[0017] The accelerator in this invention is one kind in an aluminum hydroxide (Aluminum Hydroxide), oxidation wax, vegetable oil, and stearin acid iron, two kinds, three kinds, or four kinds.

[0018] The vegetable oil used into this invention is a PURASUCHI sizer (Plasticizer), and is also an autooxidation agent. Vegetable oil will be one sort of soybean oil, epoxy soybean oil, and oleum rapae, and two sorts, if it says concretely.

[0019] Ordinary starch is the matter of ***** , however since a high polymer is the matter of rise-of-water nature, ordinary starch and an ordinary high polymer cannot be united together.

[0020] When producing the raw material or the charge for specialties of biodegradation resin, the content of the moisture of the starch which was made to dehydrate starch, was made to change the engine performance, and changed the engine performance first into the process to produce is controlled among 0.5% – 2.5%.

[0021]

[Example] As for starch and 2, in drawing 1 , 1 is [polyethylene, polystyrene, poly vinyl alcohol, and 3] a cross linkage agent and an accelerator. For kneading and 6, as for **** and 8,

dehydration, softening, and 7 are [4 / mixing and 5 / shearing and 9] extrusion.

[0022] the facility used into this invention -- first -- the ratio of die length and a diameter -- the ratio of 32:1-48:1 -- large extrusion type blocks type Extruder Twin screw is preferentially desirable. The workability ability is like drawing 1 . When carrying out JIKU (Dicing) with a facility of drawing 1 , the starch dehydrated and softened (Plastify) will unite with a high polymer, and has a charge of lumber chiefly built by operation of high-speed **** (high-speed Banbury mixer), high-speed shearing force, and a cross linkage agent with the raw material of biodegradation resin.

[0023] the heat-resistant engine performance of ordinary starch is not so good -- generally, if working temperature becomes 200 degrees C or more, it will come to generate the thing of carbonization (Carbonization). With the processing process temperature in the inside of this invention fully protecting softening (Plastify) of an ingredient, in order not to carbonize starch, the minimum was chosen as precedence in 80 degrees C and 185 degrees C of upper limits again.

[0024] The charge of lumber is chiefly used for the raw material of this invention, and the ratio of die length and a diameter is the film of 20:1-30:1. An edible bag, the product, for example, the sheet film for agriculture, like the biodegradation sheet film, the bag for packing, the bag for shopping, a garbage bag, etc. are built with blowing (Film Blowing).

[0025] An additive like commercial butane, an azo dicarboxylic acid amide foaming agent, or a commercial butane + AZOJI carvone amide foaming agent is put in with a foaming facility with the raw material of this invention, using the charge of lumber chiefly, and a plate, form network material, a form tubing material, a form lunch box, shock absorbing material of biodegradation foam, etc. are produced.

[0026] The following examples are given and this invention is explained in detail. However, a restricting [the content of this invention]-these examples thing is having to say clearly.

[0027] Example 1. JIKUSHINGU (Dicing) is carried out by the device (Extruder) which extrudes the admixture of 55% of the weight of polyethylene, 35% of the weight of starch, 7% of the weight of glycerol (Glycerol) - a SORIBI toll (Sorbierite), 2% of the weight of a PURASUCHI sizer (Plasticizer), and 1% of the weight of an accelerator, and the temperature is controlled among 80 degrees C - 185 degrees C. Blow mol JINGU (BlowMolding) of the raw material which carried out JIKUSHINGU (Dicing) is carried out, it carries out foaming (Forming), and the product of various kinds is built. The weight of various kinds of ingredients, process temperature, and the physical property ability of a product are [a table 1] as shown in a table 1.

実施例	成分						加工温度	引張強度	耐熱温度	引張伸度	折れ
	PE	PS	澱粉	交差結合剤	プラスチック	促進剤	℃	Mpa	℃	%	回
1	55		35	7	2	1	80~170	縦12 横10	100		
2		59	30	8	1	2	90~180	縦1.6 横1.7	80	8≤	10回屈折後

[0028] PE: Polyethylene PS: Polystyrene [0029] Example 2. After mixing and carrying out JIKUSHINGU (Dicing) of 49% of the weight of polystyrene, 30% of the weight of starch, 8% of the weight of glycerol (Glycerol) or the PURASUCHI sizer (Plasticizer) of 1 % of the weight (Sorbierite) of SORIBI tolls, and 2% of the weight of the accelerator, a foaming product is built with a foaming facility. As shown in a table 1, when the weight of various kinds of ingredients, process temperature, and the physical property ability of a product looked at a table 1, it came to turn out clearly that the product built by the approach of an example 1 and an example 2 satisfies [ability / the / physical property] the demand of a general activity. The biodegradation engine performance of the product of this invention is checked by the plate process, the laboratory method, and the compost method. The approach of the check and a result measure and check the biodegradation engine performance of a sample with a plate process according to the technical standards of 1. plate process:ASTM 21-90 as follows. a sample is cut to 3cmx3cm piece material, it places in the center of the culture-medium plate which came out beforehand and prepared this, the bacillus spore mixing suspension of fixed concentration is sprayed, covering is put, and 30 degrees C is put in in **1 degree C and the low-temperature box beyond relative humidity 95%, and it takes 28 day, and comes out and cultivates. The situation of

propagation of a fungus is observed and recorded periodically. The result is [0030] as shown in a table 2.

[A table 2]

番号	サンプル名称	菌糸繁殖状況 (級)				備 注
		7 日	14 日	21 日	28 日	
1	生物分解	1	2	3 -	3	
2	P S 発泡	1	2	3 -	3 +	
3	製 品	1	2	2 +	3	

[0031]

inside of a table 2: 1st class [of the class / 0th / : the trace of not breeding]: -- 2nd [propagation trace <=10%] class: -- 3rd [slight propagation 10% - 30%] class: -- whenever [inside] -- 60% or more of large quantity propagation [: with a class / the / 4th / of 60% / 30% of propagation -], and all surface ****.

[0032] 2. Compost method : cut a sample to 20cmx15cm piece material. After measuring the flare reinforcement and weight which the sample subtracts, it places horizontally in a hole with a die-length [of 100cm] x width-of-face [of 300cm] x depth of 15cm, and life dust is put on a top face, the moisture of atmospheric temperature and soil is measured, a sample is taken periodically, and a weight loss ratio (rate of reduction) and reinforcement are measured and recorded every day. The result is [0033] as shown in a table 3.

[A table 3]

埋め時間	重量損失率 (低減率) %	引裂き強度 (N)	引裂き伸度%
0 日	0	5. 8 9	2 5 4. 3 1
2 0 日	1 3	5. 1 8	2 0 9. 1 4
4 0 日	2 9	4. 6 8	1 1 6. 7 2
6 0 日	4 4	3. 9 7	6 7. 2 8

[0034] If the biodegradation resin product which appears from the numeric value of a table 2 and a table 3 is buried in natural environment after discarding it, since the growth rate of a microorganism is quick, its weight loss ratio (rate of reduction) is quick, and its degradation is also quick. It has that there is good resolvability ability.

[0035]

[Effect of the Invention] This invention makes the plastic which does not have the value of utilization even if there are many distribution costs and recycle is not only difficult, but they collect on a sale commercial scene a rule of thumb. For example, a polyethylene sheet and a product, shock absorbing material, polystyrene foam, a valve implement for daily use, etc. are replaced by biodegradation resin material. after discarding the product built with such biodegradation resin material, under natural environment and the conditions to bury, worm-eaten, microbial degradation, and oxidative degradation will almost decompose into a carbon dioxide and water by right and left for 300 days, and it is small about 20% -- it changes that it is granular in the shape of powder, and there is no environmental pollution thoroughly.

[0036] In the above, the content and example of the description of this invention and concrete were explained in detail. In the fluctuation and **** which have not separated from the content of the power requisition sheet of a patent within this technical range, and the description as above, it belongs to the range of this invention.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to a biodegradation resin ingredient, a product, and the fabrication approach.

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EFFECT OF THE INVENTION

[Effect of the Invention] On a sale commercial scene, this invention has many distribution costs and recycle is not only difficult, but they collect them. after discarding the product which replaced a polyethylene sheet and a product, shock absorbing material, polystyrene foam, a valve implement for daily use, etc. by biodegradation resin material by having made the plastic without the value of ***** into the rule of thumb, for example, was built with such biodegradation resin material, under natural environment and the conditions to bury, worm-eaten, microbial degradation, and oxidative degradation will almost decompose into a carbon dioxide and water by right and left for 300 days, and it is small about 20% -- it changes that it is granular in the shape of powder, and there is no environmental pollution thoroughly.

[0036] In the above, the content and example of the description of this invention and concrete were explained in detail. In the fluctuation and **** which have not separated from the content of the power requisition sheet of a patent within this technical range, and the description as above, it belongs to the range of this invention.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Now, the plastic currently sold to a commercial scene and the plastics packing shock absorbing material of commercialization, a plastics bag, a garbage bag, a valve implement for daily use, etc. can be said to be what can hardly be decomposed. Since such a thing that cannot be decomposed used, the thing of a part is almost fill uped with a dust field to recycle etc. Decomposing polyethylene and polystyrene under the conditions to bury requires the moon for years. So, the thrown-away plastics becomes a "white public nuisance" and not only environmental pollution but ecology natural balance is influenced.

[0003] This invention makes the plastic which does not have the value of utilization even if there are many distribution costs and recycle is not only difficult, but they collect on a sale commercial scene a rule of thumb. After discarding the product built with such biodegradation resin material with respect to biodegradation resin material, such as a polyethylene sheet and a product, shock absorbing material, polystyrene foam, and a valve implement for daily use, for example, under natural environment and the conditions to bury By worm-eaten, microbial degradation, and oxidative degradation, it is almost going to decompose into a carbon dioxide and water by right and left for 300 days, and is going to offer the biodegradation resin product small about 20% which changes that it is granular in the shape of powder, and environmental pollution does not almost have.

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MEANS

[Means for Solving the Problem] The biodegradation resin product concerning the 1st invention consists of 15 - 86% of the weight of starch, 8 - 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, 4 - 12% of the weight of a cross linkage agent, and 2 - 3% of the weight of an accelerator.

[0005] As for the biodegradation resin product concerning the 2nd invention, a cross linkage agent consists of one kind of glycerol or a SORIBI toll, or two kinds in the 1st invention.

[0006] As for the biodegradation resin product concerning the 3rd invention, an accelerator consists of one kind in an aluminum hydroxide, oxidation wax, vegetable oil, or stearin, two kinds, three kinds, or four kinds in the 1st or 2nd invention.

[0007] The biodegradation resin raw material concerning the 4th invention consists of the polyethylene of biodegradation, polystyrene of biodegradation, or polyvinyl alcohol of biodegradation.

[0008] The ingredient only for biodegradation resin concerning the 5th invention consists of biodegradation polyethylene, the polystyrene of biodegradation, or the polyvinyl alcohol of biodegradation.

[0009] A biodegradation resin product [in / in the biodegradation resin product concerning the 6th invention / the 1st or 2nd invention] consists of the sheet for agriculture, a package bag, a food bag, a shopping bag, a garbage bag, a seedling raising pan, a valve implement for daily use, a form plate, a form fruit protection network, or form shock absorbing material.

[0010] The manufacture approach of the biodegradation resin concerning the 7th invention is the manufacture approach of the biodegradation resin containing 15 - 86% of the weight of starch, 8 - 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, 4 - 12% of the weight of a cross linkage agent, and 2 - 3% of the weight of an accelerator.

[0011] The biodegradation resin product concerning the 8th invention consists of the sheet for agriculture, the package bag, the food bag, the shopping bag, the garbage bag, the seedling raising pan, the valve implement for daily use, the form plate, the form fruit protection network, or form shock absorbing material made of the biodegradation resin containing 15 - 86% of the weight of starch, 8 - 70% of the weight of polyethylene, polystyrene or polyvinyl alcohol, a 4 - 12-% of the weight cross linkage agent, and 2 - 3% of the weight of an accelerator.

[0012]

[Embodiment of the Invention] This invention makes the plastic which does not have the value of utilization even if there are many distribution costs and recycle is not only difficult, but they collect on a sale commercial scene a rule of thumb. After discarding the product which replaced with biodegradation resin material, such as a polyethylene sheet and a product, shock absorbing material, polystyrene foam, and a valve implement for daily use, and was built with such biodegradation resin material, for example, under natural environment and the conditions to bury worm-eaten, microbial degradation, and oxidative degradation will almost decompose into a carbon dioxide and water by right and left for 300 days, and small about 20% -- it changes that it is granular in the shape of powder, and there is almost no environmental pollution.

[0013] Especially this invention attains to biodegradation resin packaging, division, a biodegradation resin polyethylene sheet, a sheet product, polyethylene foaming shock absorbing material and a polyethylene air cap, a polyethylene foaming plate, and a valve implement for daily use about a biodegradation resin product.

[0014] The product of this invention makes starch a basic material, and the polyethylene, polystyrene, or polyvinyl alcohol of a constant rate is mixed and put in. Cross linkage agent : Glycerol (Glycerol), a SORIBI toll (Sorbierite), Plus CHISAIZA (Plasticizer) : Vegetable oil, a lubricating oil, calcium stearate (Calcium Stearate), Accelerator: It fully mixes with an aluminum hydroxide (Aluminum Hydroxide), oxidation wax, a calcium oxide, and lead stearate and is processed through a reaction type double screw-thread guide extruder machine the back, the raw material which contains the amount of starch to 86% (highest) can be built. This raw material is used and it is Blow. Molding is carried out, it foams on the sheet film of biodegradation, and the shock absorbing material of biodegradation, protection NETO of fruit, form tubular material, a form plate, a lunch box, etc. can be produced.

[0015] The biodegradation resin product of this invention contains the accelerator of polystyrene, 4 - 12% of the weight of a cross linkage agent, 2 - 3% of the weight of an autoxidation agent, and others. [***** / 15 - 86% of the weight of starch, and / 8 - 70% of the weight of / polyethylene]

[0016] The starch used into this invention is starch of industrial use. Grain size will be 100 meshes (mesh) - 600 meshes, and if it says concretely, they will be one kind in amylum maydis and sweet potato starch, two kinds, three kinds, etc. The cross linkage agent used into this invention is glycerol (Glycerol). In one kind of a SORIBI toll (Sorbierite), or two kinds, glycerol (Glycerol) is soap-ized (milky) glycerol (Glycerol) or compound glycerol (Glycerol).

[0017] The accelerator in this invention is one kind in an aluminum hydroxide (Aluminum Hydroxide), oxidation wax, vegetable oil, and stearin acid iron, two kinds, three kinds, or four kinds.

[0018] The vegetable oil used into this invention is a PURASUCHI sizer (Plasticizer), and is also an autoxidation agent. Vegetable oil will be one sort of soybean oil, epoxy soybean oil, and oleum rapae, and two sorts, if it says concretely.

[0019] Ordinary starch is the matter of ***** , however since a high polymer is the matter of rise-of-water nature, ordinary starch and an ordinary high polymer cannot be united together.

[0020] When producing the raw material or the charge for specialties of biodegradation resin, the content of the moisture of the starch which was made to dehydrate starch, was made to change the engine performance, and changed the engine performance first into the process to produce is controlled among 0.5% - 2.5%.

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EXAMPLE

[Example] As for starch and 2, in drawing 1, 1 is [polyethylene, polystyrene, poly vinyl alcohol, and 3] a cross linkage agent and an accelerator. For kneading and 6, as for **** and 8, dehydration, softening, and 7 are [4 / mixing and 5 / shearing and 9] extrusion.

[0022] the facility used into this invention -- first -- the ratio of die length and a diameter -- the ratio of 32:1-48:1 -- large reaction type blocks type Extruder Twin Seren is preferentially desirable. The workability ability is like drawing 1. When carrying out JIKU (Dicing) with a facility of drawing 1, the starch dehydrated and softened (Plastify) will unite with a high polymer, and has a charge of lumber chiefly built by operation of high-speed **** (high-speed Banbury mixer), high-speed shearing force, and a cross linkage agent with the raw material of biodegradation resin.

[0023] the heat-resistant engine performance of ordinary starch is not so good -- generally, if working temperature becomes 200 degrees C or more, it will come to generate the thing of carbonization (Carbonization). With the processing process temperature in the inside of this invention fully protecting softening (Plastify) of an ingredient, in order not to carbonize starch, the minimum was chosen as precedence in 80 degrees C and 185 degrees C of upper limits again.

[0024] The charge of lumber is chiefly used for the raw material of this invention, and the ratio of die length and a diameter is the film of 20:1-30:1. An edible bag, the product, for example, the sheet film for agriculture, like the biodegradation sheet film, the bag for packing, the bag for shopping, a garbage bag, etc. are built with blowing (Film Blowing).

[0025] An additive like commercial butane, an azo dicarboxylic acid amide foaming agent, or a commercial butane + AZOJI carvone amide foaming agent is put in with a foaming facility with the raw material of this invention, using the charge of lumber chiefly, and a plate, form network material, a form tubing material, a form lunch box, shock absorbing material of biodegradation foam, etc. are produced.

[0026] The following examples are given and this invention is explained in detail. However, a restricting [the content of this invention] - these examples thing is having to say clearly.

[0027] Example 1. JIKUSHINGU (Dicing) is carried out by the device (Extruder) which extrudes the admixture of 55% of the weight of polyethylene, 35% of the weight of starch, 7% of the weight of glycerol (Glycerol) - a SORIBI toll (Sorbierite), 2% of the weight of a PURASUCHI sizer (Plasticizer), and 1% of the weight of an accelerator, and the temperature is controlled among 80 degrees C - 185 degrees C. Blow mol JINGU (BlowMolding) of the raw material which carried out JIKUSHINGU (Dicing) is carried out, it carries out foaming (Forming), and the product of various kinds is built. The weight of various kinds of ingredients, process temperature, and the physical property ability of a product are [a table 1] as shown in a table 1.

実施 例	成 分						加工温度	引張強度	耐熱温度	引張伸度	折れ
	PE	PS	澱粉	交差結合剤	プラスチックイ	促進剤	℃	Mpa	℃	%	回
1	55		35	7	2	1	80~170	第12 第10	100		
2		59	30	8	1	2	90~180	第1.6 第1.7	80	8±	10回無断裂

[0028] PE: Polyethylene PS: Polystyrene [0029] Example 2. After mixing and carrying out JIKUSHINGU (Dicing) of 49% of the weight of polystyrene, 30% of the weight of starch, 8% of the

weight of glycerol (Glycerol) or the PURASUCHI sizer (Plasticizer) of 1 % of the weight (Sorbierite) of SORIBI tolls, and 2% of the weight of the accelerator, a foaming product is built with a foaming facility. As shown in a table when the weight of various kinds of ingredients, process temperature, and the physical property ability of a product looked at a table 1, it came to turn out clearly that the product built by the approach of an example 1 and an example 2 satisfies [ability / the / physical property] the demand of a general activity. The biodegradation engine performance of the product of this invention is checked by the plate process, the laboratory method, and the compost method. The approach of the check and a result measure and check the biodegradation engine performance of a sample with a plate process according to the technical standards of 1. plate process: ASTM 21-90 as follows. a sample is cut to 3cmx3cm piece material, it places in the center of the culture-medium plate which came out beforehand and prepared this, the bacillus spore mixing suspension of fixed concentration is sprayed, covering is put, and 30 degrees C is put in in **1 degree C and the low-temperature box beyond relative humidity 95%, and it takes 28 day, and comes out and cultivates. The situation of propagation of a fungus is observed and recorded periodically. The result is [0030] as shown in a table 2.

[A table 2]

番号	サンプル名称	菌糸繁殖状況 (級)				備 注
		7日	14日	21日	28日	
1	生物分解	1	2	3 -	3	
2	P S発泡	1	2	3 -	3 +	
3	製 品	1	2	2 +	3	

[0031]

inside of a table 2: 1st class [of the class / 0th / : the trace of not breeding]: -- 2nd [propagation trace <=10%] class: -- 3rd [slight propagation 10% - 30%] class: -- whenever [inside] -- 60% or more of large quantity propagation [: with a class / the / 4th / of 60% / 30% of propagation -], and all surface ****.

[0032] 2. Compost method : cut a sample to 20cmx15cm piece material. After measuring the flare reinforcement and weight which the sample subtracts, it places horizontally in a hole with a die-length [of 100cm] x width-of-face [of 300cm] x depth of 15cm, and life dust is put on a top face, the moisture of atmospheric temperature and soil is measured, a sample is taken periodically, and a weight loss ratio (rate of reduction) and reinforcement are measured and recorded every day. The result is [0033] as shown in a table 3.

[A table 3]

経過時間	重量損失率 (低減率) %	引裂き強度 (N)	引裂き伸度%
0日	0	5.89	254.31
20日	13	5.18	209.14
40日	29	4.68	116.72
60日	44	3.97	67.28

[0034] If the biodegradation resin product which appears from the numeric value of a table 2 and a table 3 is buried in natural environment after discarding it, since the growth rate of a microorganism is quick, its weight loss ratio (rate of reduction) is quick, and its degradation is also quick. It has that there is good resolvability ability.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is flow chart drawing showing a facility of operation of this invention.

[Description of Notations]

- 1 Starch
- 2 Polyethylene, Polystyrene, Poly Vinyl Alcohol
- 3 Cross Linkage Agent, Accelerator
- 4 Mixing
- 5 Kneading
- 6 Dehydration, Softening
- 7 ****
- 8 Shearing
- 9 Extrusion

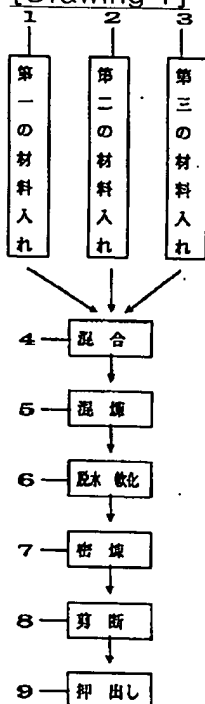
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DRAWINGS

[Drawing 1]



[Translation done.]